

# SURGICAL TREATMENT OF PATELLOFEMORAL INSTABILITY

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## ABSTRACT

**Objective:** To describe functional outcomes following surgical treatment of patients with patellofemoral instability submitted to patellar realignment. **Methods:** This was a retrospective study evaluating 34 operated knees for patellofemoral instability between 1989 and 2004. The patients were evaluated in the late postoperative period when a functional questionnaire was applied. **Results:** After a mean follow-up time of 6 years and 5 months, the mean score was 82.94 in the surgical group ( $p=0.00037$ ). The

results of this investigation showed pain relief in 97.05% and low rate of recurrent dislocation (5.88%), although lower scores were seen in intense articular activities (squatting, running and jumping). No patient developed osteoarthritis while being followed up. **Conclusion:** The procedure for joint described in this paper was shown to be effective for treating patients with recurrent patellofemoral instability.

**Keywords** – *Joint instability; Patella; Knee*

## INTRODUCTION

Patellofemoral instability is still a major challenge for the orthopedist; there is no consensus on whether the best approach is conservative or surgical<sup>(1,2)</sup> and, in cases of surgical indication, on what is the best technique to be employed. Those that involve the release of the lateral retinaculum associated with repair of the vastus medialis are called proximal realignment<sup>(3,4)</sup> and can be performed through open or closed (arthroscopic) access<sup>(5)</sup>. Those that use bone procedures on the anterior tibial tuberosity in order to improve joint biomechanics are called distal realignment<sup>(4,6)</sup> (Figure 1).

Dejour et al.<sup>(7)</sup> considered four predisposing factors to dislocation: trochlear dysplasia, patellar lateral tilt, interpreted as dysplasia of the vastus medialis oblique, high patella, and lateralization of the anterior tibial tuberosity (increased Q angle). In recent decades, greater importance has been given to the medial patellofemoral ligament as a joint stabilizer, and its repair has been described mainly in cases of traumatic dislocation in

the absence of predisposing factors<sup>(8,9)</sup>. Other surgical procedures to be considered, though in situations of exception, are trochleoplasties and partial or total patellectomies<sup>(8)</sup>.

Didactically, chronic patellofemoral instabilities can be divided into four groups: major instability (habitual and inveterate dislocation), objective instability (recurrent and traumatic dislocation), potential instability and patellofemoral osteoarthritis<sup>(1,6,7)</sup>.

The objective of this paper is to describe the functional results of the surgical treatment of patients with habitual or recurrent patellofemoral instability undergoing realignment of the extensor apparatus.

## METHODS

Between February and March 2006, patellofemoral instability data were collected from patients postoperatively. Thirty-six patients with instability underwent surgery between December 1989 and February 2004; 28 patients were included in the study, totaling 34 knees

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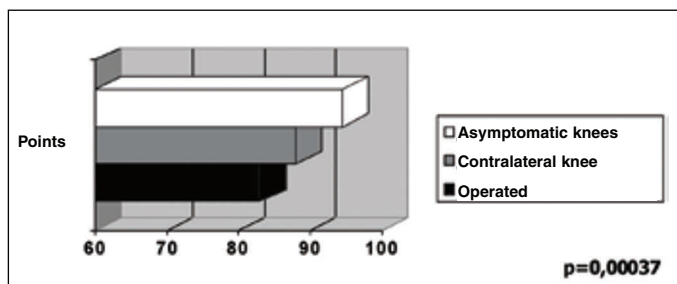
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**Figure 1** – Mean scores from the knees evaluated.

(18 left and 16 right), of which six cases were operated bilaterally. The maximum follow-up time was 16 years and three months, the minimum was two years, with an average of six years and five months ( $SD = 4.75$  years). Twenty-two patients were female and six were male, and the age at the time of surgery ranged between 16 and 50 years, with an average of 27.52 years ( $SD = 9.78$  years,  $SE = 1.67$  years). Eight knees (23.5%) had three or fewer episodes of patellofemoral dislocation before treatment, five (14.5%) had between four and ten episodes, and 21 (61.8%) had more than ten documented episodes.

Patients with patellofemoral osteoarthritis at the time of diagnosis and those who underwent proximal realignment or other previous surgeries on the same knee were excluded from the study. We were unable to contact eight patients at the time of evaluation.

All patients were operated by the same surgeon and underwent proximal and distal realignment; 23 knees were operated by the Elmslie-Trillat procedure and 11 underwent medialization and distalization of the anterior tibial tuberosity.

A questionnaire developed and validated by Kujala et al.<sup>(10)</sup> specifically for the evaluation of diseases of the patellofemoral joint was completed by the patient in the presence of two examiners or by phone by those who lived elsewhere.

The questionnaires were analyzed using a predetermined program (Epiinfo 98<sup>®</sup>), and statistical regressions, chi-square ( $\chi^2$ ), and p value analysis were performed, comparing those values with the scores of normal knees. For comparison criteria, the scores obtained by the operated group were compared with those of two other groups: the 22 non-operated knees evaluated in patients who were operated unilaterally, and the 34 knees in 17 patients without orthopedic complaints.

## RESULTS

The general sum of the Kujala score was measured, the average score was 82.94 points ( $p = 0.00037$ ). The

average score in the other groups was 88.81 and 94.58 (non-operated contralateral knees and asymptomatic knees, respectively) ( $p = 0.00037$ ) (Figure 1). Variables from the Kujala protocol were analyzed separately.

After surgery, 31 (91.17%) knees had no claudication; it was mildly and occasionally present in two (5.8%) and constantly in one (2.94%) ( $p = 0.93$ ).

Thirty-three knees (97%) showed that full support was possible without pain, one knee (3%) showed painful full support. No patient responded full support to be impossible ( $p = 0.48$ ).

In 31 knees (91.17%), walking ability was unrestricted and three (8.83%) had some limitations, without, however, precluding being able to walk less than two kilometers ( $p = 0.52$ ).

When patients were asked about going up or down stairs, 26 knees (76.47%) showed no difficulty with this task, while there was mild pain in six (17.64%) when going down stairs and two (5.8%) had pain going up and down. No knee was unable to perform the task ( $p = 0.53$ ).

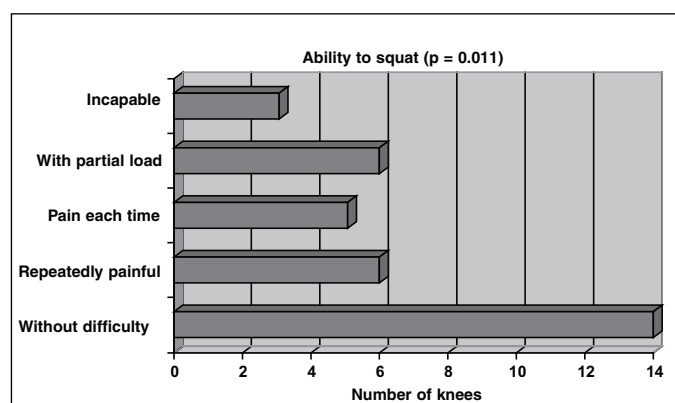
Regarding to the ability to squat, the data are illustrated in Figure 2 ( $p = 0.011$ ). With regard to running races, the data are shown in Figure 3 ( $p = 0.012$ ).

Twenty-three knees (67.64%) performed jumps without difficulty, seven (20.58%) did so with mild difficulty and four (11.76%) were unable to perform the task ( $p = 0.009$ ).

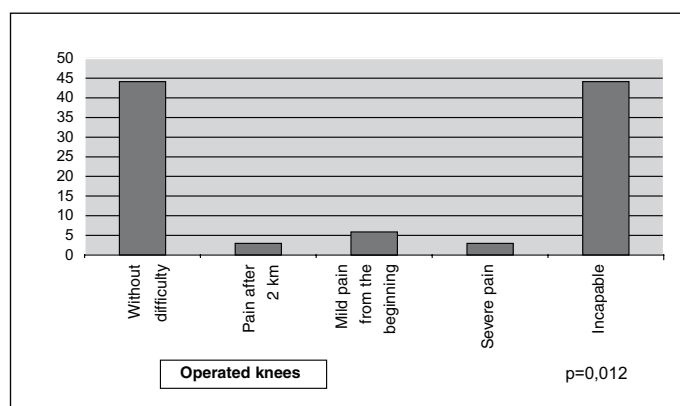
Another topic addressed by the questionnaire was pain perceived by the patient. The data are discussed in Figure 4 ( $p = 0.06$ ).

Data regarding the enlargement of the knee are presented in Figure 5 ( $p = 0.002$ ).

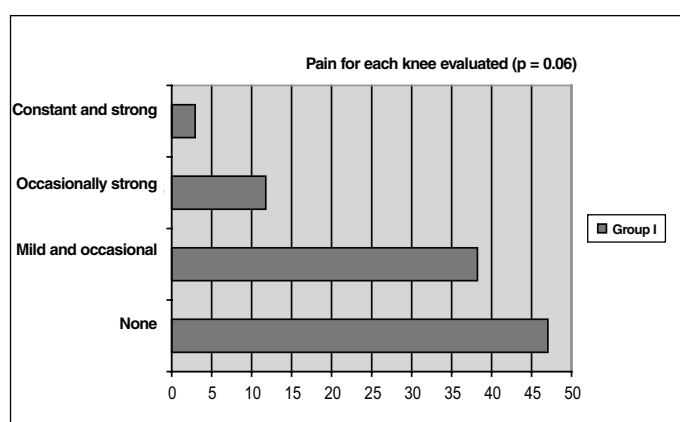
The responses of patients when asked about abnormal movements of the patella, including dislocation, are shown in Figure 6 ( $p = 0.02$ ).



**Figure 2** – Ability to squat in the operated group.



**Figure 3** – Ability to run races in the operated group – in percentages.



**Figure 4** – Distribution of pain in the group evaluated – in percentages.

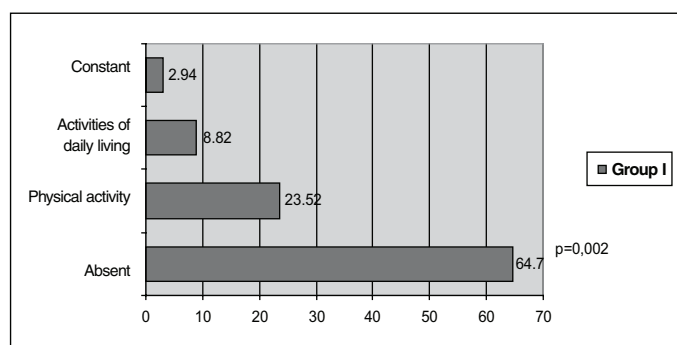
Regarding limitations in the flexion of the knee, 30 knees (88.23%) of the group had no deficit in flexion, three (8.82%) had mild deficits (less than or equal to five degrees), and one patient (2.94%) had a deficit of 15 degrees ( $p = 0.12$ ).

## DISCUSSION

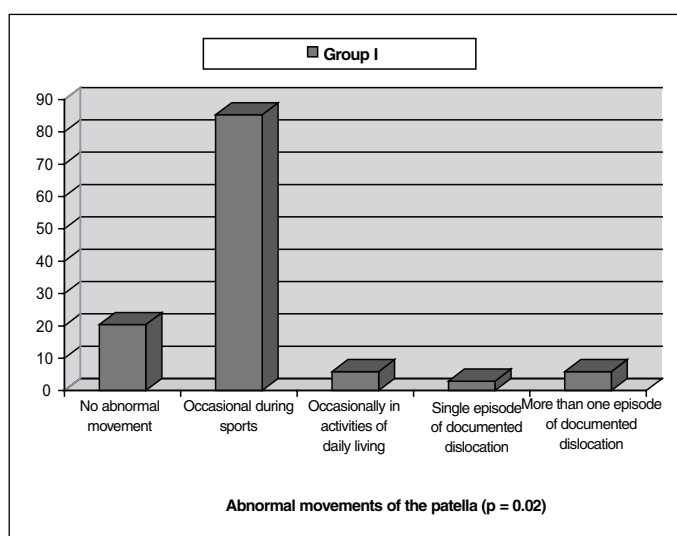
Patellofemoral instability, although uncommon, can be limiting, leading patients away from their routine activities due to a concern that another episode may occur<sup>(2,5,11,12)</sup>.

Because of this low frequency, the number of surgical cases in the literature is small, which makes this study significant. Dantas et al.<sup>(13)</sup> reported on 19 patients (24 knees) treated with retinacular release and distal realignment (anteromedialization), Carney et al.<sup>(14)</sup> reported on 18 cases treated by the Elmslie-Trillat procedure, and Karataglis et al.<sup>(15)</sup> reported on 49 knees that underwent the Elmslie-Trillat procedure (Figure 7).

In the literature, there is a clear preference for females<sup>(9,11)</sup>, which is consistent with our findings. This



**Figure 5** – Perception of the enlargement of the knee – in percentages.



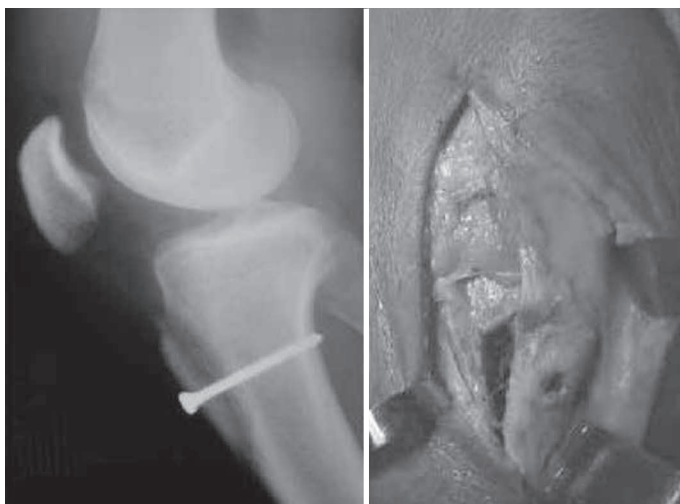
**Figure 6** – Distribution of abnormal movements of the patella in the group – in percentages.

preference is especially true in young patients engaged in sports, and the muscular difference, fitness, local anatomy, and increased Q angle are considered possible causative factors<sup>(11)</sup>.

In the analysis of the variables in isolation, the lower scores in the group occurred in the categories of greatest demand on the joint, such as squats, jumps, and races, all with statistically significant values. No scientific reference that would address this observation was found in the literature.

The diversity of evaluation protocols employed in research complicates a comparison of results found in the literature. Dantas et al.<sup>(13)</sup>, using the Lysholm scale, observed functional improvement in relation to preoperative scores after the Elmslie-Trillat procedure. In 49 knees treated by the same technique, Karataglis et al.<sup>(15)</sup> found 64.9% of excellent and good results<sup>(12)</sup>.

The redislocation index in this study was 5.88%, close to that found by Carney et al.<sup>(14)</sup>, which was 7%



**Figure 7** – Distal realignment using the Elmslie-Trillat technique A) radiological appearance; B) perioperative appearance.

in 18 cases. In the series of Dantas et al.<sup>(13)</sup>, no patient had a recurrence of dislocation.

The predisposition of patients with patellofemoral pathology to develop osteoarthritis, with or without surgical treatment, is another issue that has been addressed in the literature<sup>(3,16-19)</sup>. Some authors have reported osteoarthritis in up to 80% of cases, due to increased tension in the patellar ligament after osteotomy of the anterior tibial tuberosity<sup>(3,12,14)</sup>. Of the operated patients, none developed patellofemoral osteoarthritis in this study up to the present, contrary to the findings of Arnbjornsson et al.<sup>(2)</sup>, which showed degenerative

changes in 42% of operated knees, a higher incidence than that on the contralateral knee with instability that, however, did not undergo surgical correction.

Good functional results after a brief follow-up period may deteriorate after prolonged follow-up, as shown by studies from Nakagawa et al.<sup>(16)</sup> and Carney et al.<sup>(14)</sup>, who reported 18 and 26 years of follow-up, respectively. As the average follow-up in this study is six years and five months, deterioration of results is expected over time, which encourages us to perform a reassessment in the future. Gomes et al.<sup>(20)</sup>, in their series of cases treated by the Elmslie-Trillat procedure (20 patients) and followed for ten years, did not observe deterioration of the results during the evaluation period, with excellent and good results in 85% of patients followed.

## CONCLUSION

The operated knees showed less ability to perform activities with greater functional demand when compared with the contralateral non-operated knees and patients without complaints related to the knee.

The main objective of the realignment of the extensor mechanism, which is the stabilization of the patella, was achieved in the operated group, demonstrated by the low rate of redislocation.

Prospective studies with longer follow-up periods are needed to assess the impact of the realignment procedure in the prevention or predisposition to joint degeneration.

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